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WILLIAM LASSELL, Esq., F.R.S., President, in the Chair.

Jas. Whitbread Lee Glaisher, Esq., Trinity College, Cambridge;
Capt. Wm. Campbell, attached to the Great Trigonometrical Survey, India; and
Chas. Coppock, Esq., 38 Arthur Road, Holloway,

were ballotted for, and duly elected Fellows of the Society.

Observations of the Zodiacal Light, 1850, January to April.

By W. R. Birt, Esq.

The following *unpublished* observations of the zodiacal light were made in the earlier months of the year 1850 at the Kew Observatory, a locality especially favourable for observations of the kind. In them will be found the positions and progression of the "light" from month to month. I am not aware that so full and consecutive a series of observations have as yet been presented to astronomers; such may, however, exist, and if so, this series may be valuable for comparison with them.

The observations were commenced on January 7, 1850, when a faint, but very distinct, light was observed in the S.W. part of the heavens; it possessed a triangular form, the apex being near the planet *Saturn*, which then was not far from the first point of *Aries*; it was less bright, and more diffused, than the Milky Way, then very distinct.

January 13, 7.0. The light was seen under *Pegasus* extending rather beyond the planet *Saturn*. The dark space of sky between it and the Milky Way was very distinct.

January 30, 6.35 to 7.50. During this interval the "light" was very brilliant, but brightest towards the horizon. A line drawn through β and α *Pegasi* passed through the brightest

portion. A line from *Saturn* to the horizon, intersecting the former line, gave the principal direction of the "light" through which the planet was seen shining. The apex was situated about half way between the planet and the constellation *Aries*, and the "light" extended to about 0·66 of the distance between *Saturn* and *γ Pegasi* from the planet. Elongation about 67°.

February 3, 6.45 to 7.45. The lines drawn on the 30th of January indicated as then the general direction and brightness of the "light." The upper edge which previously had been noticed as parallel with *α* and *γ Pegasi*, on this evening was nearer to *γ*, and further from *α*, the greater portion of the "light" being between *Saturn* and *γ Pegasi*, with the planet within it. The lower edge was indicated by a line drawn from a point midway between *Saturn* and *Aries*, a little to the east of the planet directly to the horizon. Towards the close of the observation two small cumulus clouds passed between the "light" and the eye of the observer. The effect was immediately to give a diffused character to the "light," and to efface the triangular outline previously noticed.

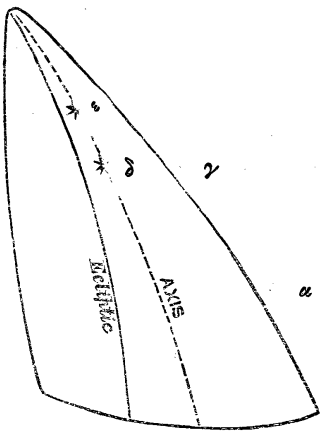
February 6, 7.20 to 8.0. "Light" very distinct, sky having cleared after a violent gale from W. and N.W. The advance of the apex was very perceptible, being distinctly traced to 21° of *Aries*. *Saturn* was situated within the "light," not far removed from the lower edge. Taking the distance between the planet and *γ Pegasi* equal to unity, the light extended to about 0·75 from the planet, and probably extended to about 0·25 of the same distance south of *Saturn*. The diminution of light from the axis towards the lower edge, and the dark space of sky on the eastern side was very apparent, as well as the direction of the upper edge from the apex situated on or near the ecliptic, between the stars *η* and *ε Piscium*, near *γ Pegasi*, towards the horizon, leaving *α Pegasi* to the west.

February 7, 7.15. Apex near *π Piscium*. Elongation, 66°.

February 12, 7.0 to 8.30. On this evening the "light" was more distinct and brilliant than it had yet been observed. The whole space between *Saturn* and *γ Pegasi*, except about 0·125, or rather less, was illuminated with a soft and delicate light. The planet was removed from the southern edge, but within the light, about the same distance as *γ Pegasi* was removed from the northern without it. The apex was situated about midway between the stars *η* and *α Piscium*, near *ο Piscium*, and the axis descended from this point between *γ Pegasi* and *Saturn*, about 0·66 from the planet towards the star. The northern edge passed from the apex near *γ* and *α Pegasi* to the horizon. The appearance of the light, as contrasted with the Milky Way, was very striking, especially in its rich, soft, and glowing character. It was remarked that on every occasion that the light had been observed, it was found to be strongest just as the evening twilight faded out. Elongation, 62°.

February 13, 7.5. "Light" very distinct and beautiful.

It stretched upwards from the horizon at an angle greater than that at which the equinoctial meets it, and less than that which the ecliptic forms with it.

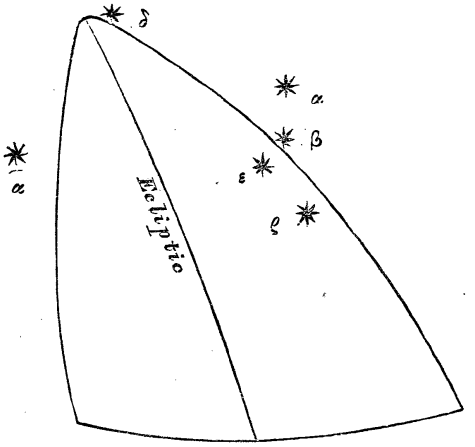


HORIZON. 1850, Feb. 13

The apex had arrived at a line joining the stars *β Arietis* and *α Piscium*, equal to an elongation of 64°. The following is the note made at the time:—"The axis is certainly not coincident with the ecliptic, the space between *Saturn* and *γ Pegasi* being nearly filled with light, so that the great body of the light is north of the ecliptic. The more probable direction of the axis would be from 29° of *Aries* past *ε* and *δ Piscium*, crossing the equinoctial colure at 5° of north declination, and meeting the equinoctial at about 340° of right ascension.

March 3, 7.30. The extent of the "light" on this evening was found by drawing a line from *α Arietis* to *α Ceti*. It extended 0·60 from *α Arietis* towards *α Ceti*. The northern edge passed very near to *γ Arietis*. It was remarked that the greater portion of the light was, as in the middle of February, north of the ecliptic, apex near 15° of *Taurus*. Elongation, 62°.

March 4, 7.30 to 8.25. The light was very distinct, but not so brilliant as on the 13th of February. The northern edge was seen to rise from W.N.W., between *γ Pegasi* and *α Andromedæ*, nearest the former star, about 0·25 of the distance between them from it. It passed through the tail of the northern fish, not far from *ϱ Piscium*, directly over *β* and *γ Arietis* to *δ Arietis*. A line drawn from *γ Arietis* to *α Ceti* gave the extent of the light, which fills about 0·75 of the distance between the stars. Apex 18° of *Taurus*. Elongation, 64°.



HORIZON. 1850, March 4.

March 6, 7.15 to 8.38. The northern edge passed close to, if not over *β Arietis*, and the "light" extended therefrom towards *α Ceti*, apparently as far as 0·80 of the distance between the stars; it also extended 0·90 of the distance from *β Arietis* to *ξ* and *ο Tauri*. The greatest intensity of the light was observed to be about midway between the line from *β Arietis* to the equinoctial colure, and exceeded that of the Milky Way. *α* and *γ Ceti* and *α Arietis* were beyond the confines of the "light." The

apex was situated about midway between ♂ *Arietis* and the *Pleiades*. It was situated in 23° *Taurus*. Elongation, 67°.

March 11, 7.30 to 8.28. On this evening the "light" was described as very distinct and beautiful, very soft and glowing in its character, but not so brilliant as on the 13th of February. In shape it appeared to assume somewhat of a more rounded form than it presented during the earlier observations, especially on its southern edge, and its axis coincided more closely with the ecliptic than it did at those times. The stars in its neighbourhood, but beyond its outlines, were the following :—The *Pleiades* just beyond the apex ; on the north the constellation *Musca* (some distance from it), and *α Arietis;* on the south *ξ* and *ο Tauri*, *α Ceti*, and *γ Ceti*. The extent of the light was as follows : *β Arietis* to *α Ceti* 0·8. *β Arietis* to *ξ* and *ο Tauri* 0·9. *β Arietis* to *γ Ceti*, nearly, if not the whole space. The brightest portion, which more or less coincided with the axis, passed from a little south of the *Pleiades* towards the horizon crossing the line from *β Arietis* to *α Ceti* at about 0·4. The northern edge passed very obliquely between *α* and *γ Arietis*, near to and just to the north of *β Arietis*.

March 12, 7.45 to 7.55. Although the stars were dim, as if covered by a very thin sheet of cirro-stratus, and the light was not bright, about half the lustre which it exhibited on the 13th of February, the outline was distinct. The apex extended nearly as far as the *Pleiades*, and the northern edge passed very obliquely between *α* and *β Arietis ;* the southern edge appeared to have approached nearer to *ξ* and *ο Tauri* and to *α Ceti*.

March 13, 7.30 to 7.50. Although the light was very distinct, it appeared of a pale, whitish colour, and during the 20 minutes it was under observation not the slightest change in its intensity was detected ; it continued of the same lustre the whole of the time, shining with a steady radiance. The smaller stars were scarcely visible, and *β* and *γ* were perceptibly dimmer than when seen exterior to the light. The *Pleiades* appeared as the visible apex ; but a careful scrutiny resulted in the detection of their being slightly north of it.

March 13, 8.0 to 8.8. During these eight minutes well-marked intermissions in the luminosity of the light were detected. They were not of the nature of pulsations in the usual acceptation of the term, but consisted of alternate brightenings and dimmings of the entire mass, such as might be produced by the approach and recess of a luminous body. These alternations made themselves evident by the disappearance of their luminous edges, *α* and *β Arietis* for an instant or so appearing perfectly free from light, and then the edge extending again nearly as far as *α*. Nothing of this kind was seen between 7.30 and 7.50. It was particularly remarked that the great mass of light occupied about 0·5 of the line between *β Arietis* and *α Ceti*, or north of the Ecliptic, and this has been characteristic of the observations throughout.

March 15, 8.0 to 9.15. The "light" was very distinct, but rather pale and shining with a steady radiance, the brightest portion being west of the line joining *β Arietis* and *α Ceti*. The northern edge was nearer to *α Arietis*, and the southern had approached *α Ceti* and *ξ* and *o Tauri*, distance from *β Arietis* to *α Ceti* 0·85, and to *ξ* and *o Tauri* 0·95, apex 26° of *Tauri*, elongation 61°.

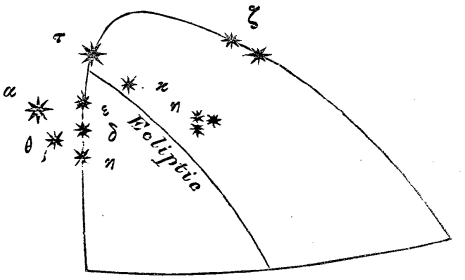
March 29, 8.15. Apex near *ν Tauri*. Northern edge passed a little north of the *Pleiades* through the constellation *Musca* and north of *α Arietis*. The southern edge passed about 0·66 of the line from the *Pleiades* to *Aldebaran*, nearest the latter star. On the same line the northern edge was about 0·125 of its extent *beyond* the *Pleiades*.

March 31, 8.30 to 8.50. A very strong Auroral light was seen in the magnetic north, which appeared to exert a decided and unmistakable influence on the Zodiacal light, the apex being still near *ν Tauri*. The light of the Zodiacal light appeared to be similar to that of the Aurora, although it was not so bright as that, it was quite as bright, if not brighter, than on the 12th and 13th of February. The distinction between the Aurora and the Zodiacal light was well marked.

April 2, 8.20 to 9.0. The "light" was very beautiful; its richness and softness being considerably greater than observed on the 12th and 13th of February, and its glowing character gave it an appearance which, for a mild radiance and chastened brilliancy, is seldom surpassed. The apex being still situated near *ν Tauri*, the northern edge passed about 0·5 the distance between *ζ Persei* and the *Pleiades* (which were quite involved in the light) through *Musca*, north of *α Arietis* to the horizon. The southern edge passed from the apex about 0·66, from the *Pleiades* to *Aldebaran*, thence to near *ξ* and *o Tauri*. During the last 10 minutes the light appeared occasionally to extend as far as *ζ Persei*.

April 5, 8.45 to 8.50. Light not so brilliant. Apex extended as far as *τ Tauri*. Northern edge passed about 0·5 between the *Pleiades* and *ζ Persei*, the southern edge 0·66 from the *Pleiades* to *Aldebaran*.

April 10, 8.30 to 9.15. The apex extended to a little beyond *τ Tauri*, a line drawn from the star through the *Pleiades* was more or less coincident with the brightest portion of the light, which extended as far as *ζ Persei*. The northern edge was well marked, and could readily be traced from the apex past *ζ Persei*, and the constellation *Triangulum* to the horizon. *Aldebaran* was seen beyond the confines of the light to the south.



HORIZON. 1850, April 10.

Thus far the observations of 1850.

On the evening of April 7, 1871, at 9.15, I obtained a very favourable view of the Zodiacal light, and described it as a very soft glowing light, quite as bright, if not brighter, than the Milky Way. The *Pleiades* were involved in it, and appeared to be in its axis, or nearly so. The northern boundary passed near the star *ζ Persei*, and the southern boundary, close upon *γ*, *δ*, and *ε Tauri*. The apex, which appeared blunted and ill defined, extended to *κ Tauri*, and was directed towards the planet *Jupiter*. *Aldebaran* was quite clear of the light. On the evening of the 10th of April, 1871, the form and character of the "light" were identically similar to the appearance which it presented on the 10th of April, 1850.

There are two very prominent features that present themselves in connexion with these observations. The position of the great mass of light being constantly north of the Ecliptic, and the apparent change in the *form* of the "light," or at least that portion of it which forms the apex of the luminous triangle or cone. This is very perceptible in the groups of observations, those in February presenting a narrower cone of light, the axis being very decidedly *inclined* to the Ecliptic, although the apex was seen more or less on or near the Ecliptic. This group of observations is in decided contrast with that of a month later—viz., March. By this time the cone of light had become larger, the apex more rounded, and the inclination of the axis to the ecliptic changed; the greatest extent of light being still northward of the Ecliptic. In April the progression of the widening of the cone was very apparent; if equal distances from the apex along the axis be taken for February, March, and April, and the breadth of the cone measured; as indicated by the position of the "light" among the neighbouring stars, the differences of the three sets are so distinct as to lead to the suspicion that we view the phenomenon differently as the Earth advances in her orbit from the point at which we beheld it in the winter months.

On a Remarkable Appearance during the Solar Eclipse, Dec. 22, 1870. By R. W. H. Hardy, Commander R.N.

I have seen no account in any of the published reports of the late Solar eclipse of a remarkable appearance which attended it, and which was witnessed by the Rev. Henry H. Winwood, M.A., of Bath, and by myself from my Garden Observatory.

Some time after the commencement of the eclipse the sky here became partially overcast with two strata of cirrous clouds arranged at different elevations, one above the other. The lower stratum was much broken, leaving larger spaces bare. But neither of these strata offered any serious obstruction, for a considerable time, to our observation of the eclipse.